

## Significant range extensions and new records of mosses from tropical Australia

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### Abstract

We report *Pleuridium nervosum* and *Pseudotaxiphyllum pohliaecarpum* as new to the Australian Wet Tropics bioregion, and *Fabronia brachyphylla* and *Pleuridium nervosum* as new to the adjacent Einasleigh Uplands bioregion. We also report significant range extensions for other species, and new records of several very rare species including *Distichophyllum mittenii*, *Entodontopsis pygmaea*, *Meiotheciella papillosa*, *Philonotis slateri*, *Rhynchostegium nanopennatum*, and *Trachythecium verrucosum*.

### Introduction

Since 2012 we have been conducting regular fieldwork in the Australian Wet Tropics, north eastern Queensland, focusing on mosses (Bryophyta). We have previously reported two moss genera (*Clastobryophilum* and *Entodontopsis*) and one moss species (*Meteoriopsis undulata*) as new to Australia from this work (Cairns and Meagher 2014; Meagher and Cairns 2014, 2016; Ramsay et al. 2017). The following collections are new records for the Australian Wet Tropics bioregion (IBRA 2012), significant range extensions within the bioregion, or species not seen in the bioregion since before the middle of the last century. New records for the adjacent Einasleigh Uplands bioregion (IBRA 2012) are also described. Our collections listed here have been lodged in the Queensland Herbarium (BRI).

### New records for the Australian Wet Tropics bioregion

#### *Pleuridium nervosum* (Hook.) Mitt. (Ditrichaceae)

Mt Lewis Road, D. Meagher WT-077A & A. Cairns, 18 Sep 2012 (BRI-AQ858151), on shallow compacted soil on road (Fig. 1).

The closest record is from the Einasleigh Uplands bioregion, as detailed below.



*Pleuridium nervosum* is a pioneer of disturbed sites and is probably more common in the Wet Tropics than the present records suggest. A description of the species is not available on Australian Mosses Online, but it is described and illustrated in Catcheside (1980).



**Fig. 1.** *Pleuridium nervosum* (Meagher WT-077A & Cairns): growing with *Wilsoniella karsteniana* (paler green plants). Scale bar = 5 mm.

***Pseudotaxiphyllum pohliaecarpum* (Sull. & Lesq.) Z.Iwats. (Hypnaceae)**

Lake Barrine circuit track, Atherton Tableland, A. Cairns WT-378 & D. Meagher, 10 May 2014 (BRI-AQ858152), on earth bank (Fig. 2a, b, c), 757 m asl.

Bellenden Ker Range, western ridge, D. Meagher WT-1173, 18 August 2016 (BRI-AQ858153), on rock, 1547 m asl.

The closest known population of this species is at Weeping Rocks, 72 km east of Armidale in New South Wales (Streimann 47736, 5 Apr 1991, NSW894930). The only other Australian collection was made 100 years ago in the Blue Mountains west of Sydney (Sassafras Gully, Springwood, Watts NSW-10917, Jan 1916, NSW245625). However, the species might still occur there because Sassafras Gully is within a bushland reserve and still in a more or less natural state, although subject to occasional bushfires. Müller and Tan (2013) recently reported *P. pohliaecarpum* from New Caledonia, thus extending its distribution into the western Pacific.





**Fig. 2.** *Pseudotaxiphyllum pohliaecarpum* (Cairns WT-378 & Meagher): (a) habit, (b) habitat at Lake Barrine, (c) shoot tip, showing numerous gemmae at the apex. Scale bars: a = 5 mm, c = 1 mm.

### New records for the Einasleigh Uplands bioregion

#### *Fabronia brachyphylla* Müll.Hal. ex Broth. (Fabroniaceae)

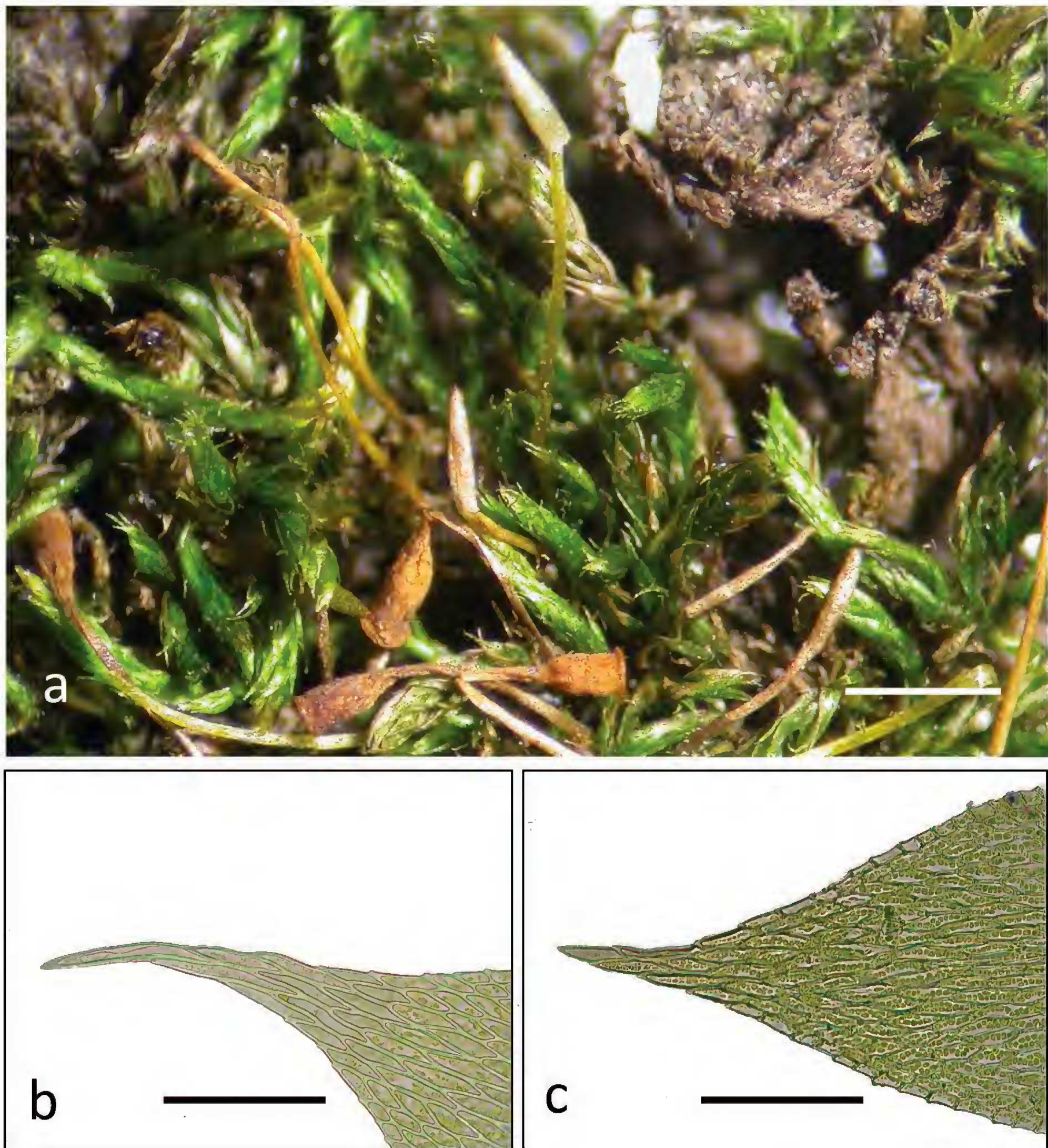
Irvinebank, Einasleigh Uplands, A. Cairns WT-392 & D. Meagher, 11 May 2014 (BRI-AQ858160), on the lower trunk of a *Ficus* sp. tree between a dry creek bed and the main road (Fig. 3a), 759 m asl. The closest



record is from Wattle Creek on the Builyan–Monto Road, 30 km north-east of Monto in southern Queensland (Streimann 65082, 8 Aug 1999, CANB–609572). Several other *Fabronia* collections from the Wet Tropics in Australian herbaria are likely to be this species. The length of the terminal apical cell of *F. brachyphylla* is similar to that of cells of the upper lamina (Fig. 3b). *Fabronia scottiae* differs in having a long apiculus consisting of elongate, thick-walled cells (Fig. 3c). *Fabronia australis* differs in having the leaf margins ciliate or at least with long teeth, as well as an apiculus similar to that of *F. scottiae*.

***Pleuridium nervosum* (Hook.) Mitt. (Ditrichaceae)**

Gibbs Creek, west of Irvinebank, A. Cairns WT-395 & D. Meagher, 11 May 2014 (BRI–AQ858150), on soil of creek bank, 731 m asl. There are few bryophyte records from the Einasleigh Uplands, and this species is likely to have been overlooked because of its small size and its nondescript appearance when sterile.



**Fig. 3.** (a) *Fabronia brachyphylla* habit, dry (Cairns WT-392 & Meagher), (b) leaf apex of *F. scottiae* (Stone 20437), (c) leaf apex of *F. brachyphylla* (Cairns WT-392). Scale bars: a = 5 mm; b, c = 100  $\mu$ m.



### Other significant records

#### *Distichophyllum mittenii* Bosch & Sande Lac (Hookeriaceae)

Bellenden Ker Range, on a tree-fern, 1466 m asl, occurring with *D. crispulum* (Hook.f. & Wilson) Mitt., *D. Meagher* WT-1052A, 16 Aug 2016 (BRI-AQ858156).

The only other records of this species in Australia are from the Kirrama Range, west of Cardwell (Stone, 16 Aug 1980, MEL-2233286A) and Danbulla National Park on the Atherton Tablelands (Bell 658, Oct 1982, AD). The Bellenden Ker site is by far the highest altitude of the three Australian locations.

*Distichophyllum mittenii* is easily mistaken for *D. crispulum* (Hook.f. & Wilson) Mitt. because the overall appearance is very similar (Fig. 4a). However, the leaves of *D. mittenii* (Fig. 4b) are spatulate to obovate, 2.0–2.8 mm × 1.0–1.2 mm with a narrow margin 2 cells wide at the leaf base, narrowing to 1 cell wide at the apex, a wide rounded apex and a very small apiculus, whereas the leaves of *D. crispulum* (Fig. 4c) are elliptic to oblong-oval, 1.1–2.4 × 0.50–0.75 mm, with a distinct border of elongate cells 2–3 cells wide and a prominent apiculus (Streimann 2012).

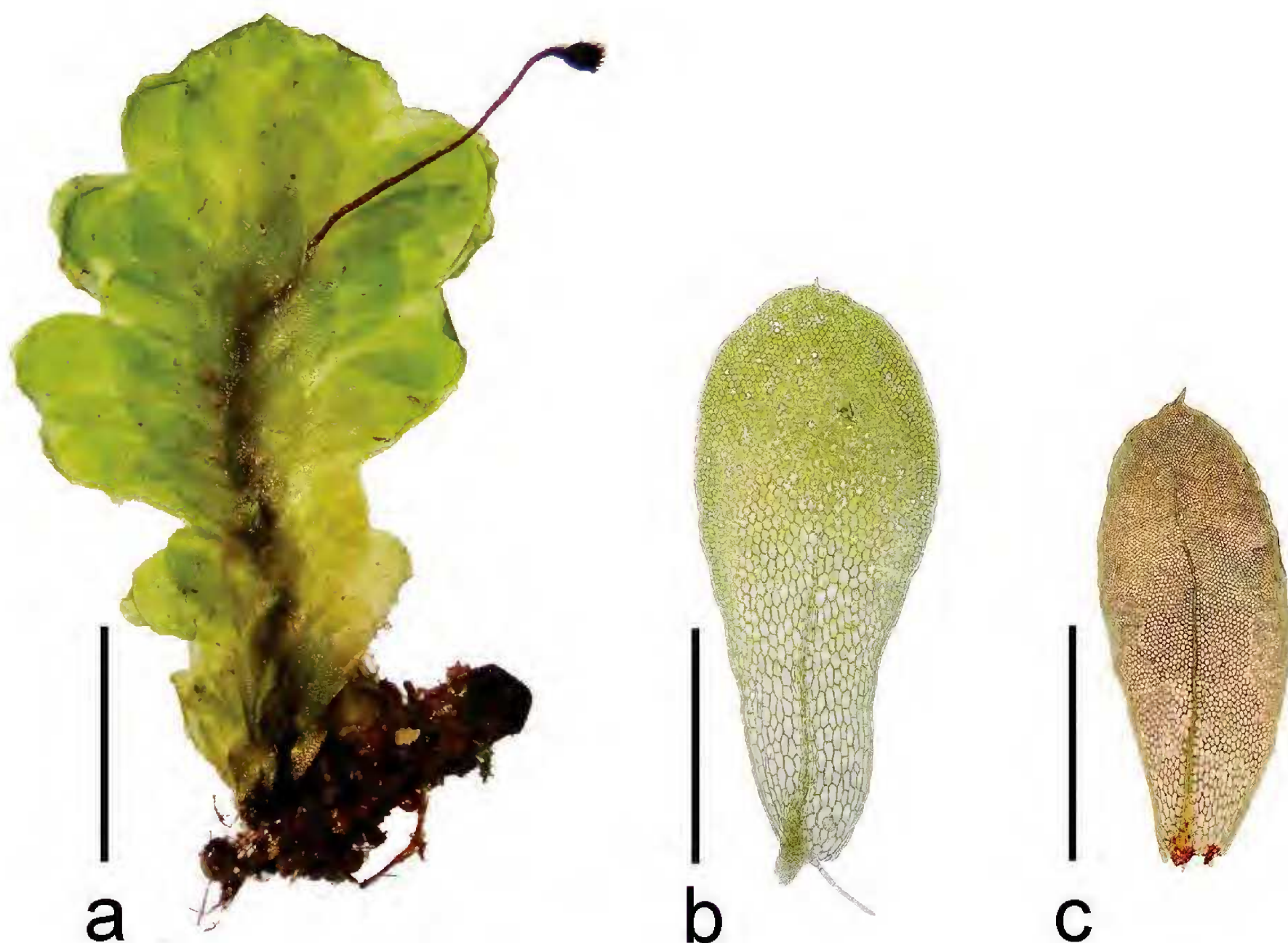


Fig. 4. (a) *Distichophyllum mittenii* whole plant (Meagher WT-1052A), (b) *D. mittenii* leaf (Meagher WT-1052A), (c) *D. crispulum* leaf (Cairns WT-031). Scale bars: a = 2 mm; b, c = 1 mm.

#### *Entodontopsis pygmaea* (Paris & Broth.) W.R.Buck & Ireland (Stereophyllaceae)

Cochable Creek/H Road, Tully Gorge National Park, A. Cairns WT-612 & D. Meagher, 27 May 2015 (BRI-AQ858158), on a sloping branch at the edge of the track, 219 m asl; Millaa Millaa–Ravenshoe Road junction, Atherton Tableland, A. Cairns WT-649 & D. Meagher, 29 May 2015 (BRI-AQ858159), on the upper trunk of an isolated tree, 831 m asl.

We reported this species as new to the Australian flora from a specimen collected in 2013 at Lake Barrine (Meagher and Cairns 2014). We have since found it at the two other well-separated sites listed above (Fig. 5). The range of altitudes and different habitats suggest that this species might be more widespread in the Australian Wet Tropics than these few records suggest, particularly because it is a small and easily overlooked species.

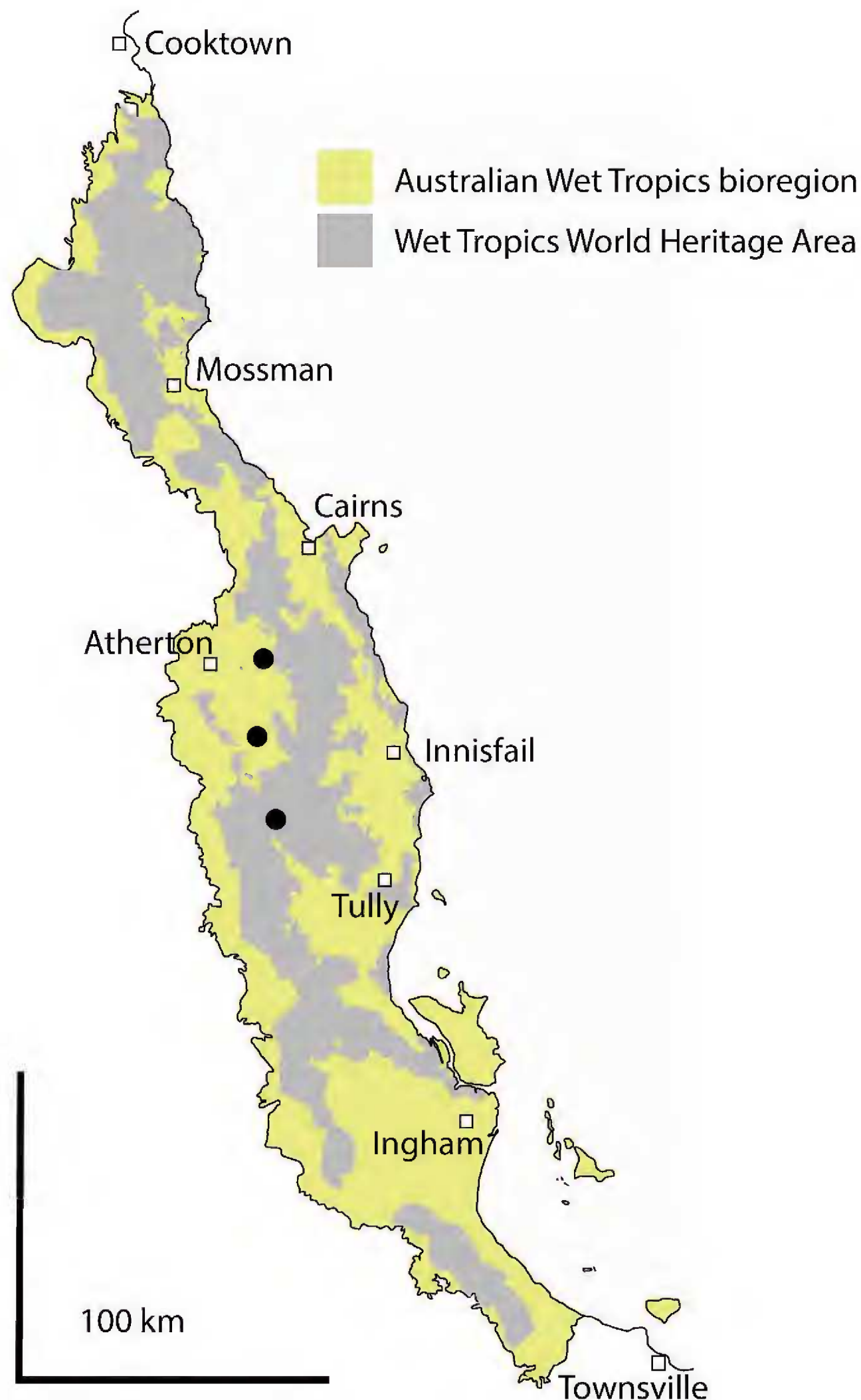


Fig. 5. Known locations (black dots) of *Entodontopsis pygmaea* in Australia.

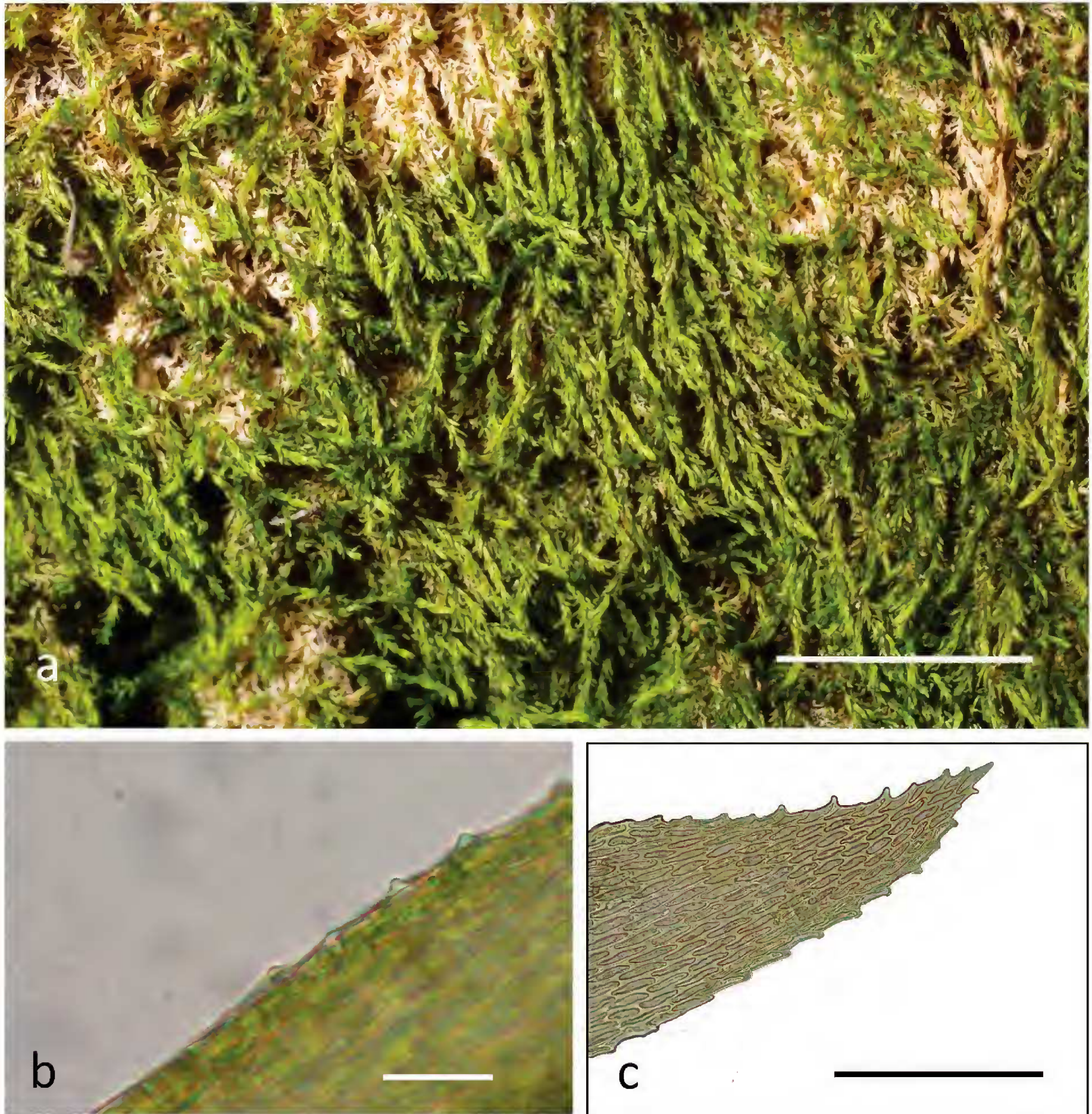
***Meiotheciella papillosa* (Broth.) B.C.Tan, W.B.Schofield & H.P.Ramsay (Sematophyllaceae)**

Cardwell foreshore, A. Cairns WT-098B & D. Meagher, 19 Sep 2012 (BRI-AQ858161), epiphyte on bark of *Calophyllum inophyllum* (Fig. 6a). This species was previously known in Australia from a single collection, made by Dan Norris in Mt Spec National Park in the far south of the Australian Wet Tropics bioregion (Norris 39869, 26 Apr 1974, NSW729970). *Meiotheciella papillosa* is also known from Java, the Philippines, Marshall Islands, Papua New Guinea, New Caledonia and Fiji. The Cardwell specimen agrees well with the description of *Meiotheciella papillosa* in Ramsay et al. (2004). Leaves are variable in length, ovate, ovate-lanceolate to lanceolate,  $0.5\text{--}0.83 \times 0.20\text{--}0.32$  mm wide at widest part (1/3 from base), concave or with two plicae; apices somewhat variable, obtuse to acute or short acuminate. Laminal cells are oval, rhomboidal to short fusiform, unipapillose or smooth, with the papillose cells often in patches (Fig 6b).

Ramsay et al. (2004) described the species as morphologically variable, particularly the leaf apices, the presence or absence of a single papilla on laminal cells, and the perichaetial leaf marginal serration. Inner perichaetial



leaves in our specimen are serrulate in the upper half (Fig. 6c). Papillae are often patchy and difficult to see on separated leaves, but are more obvious on microscopic examination of leafy stems. Some plants have more papillae than others, suggesting that there may be an environmental effect of different microclimates (e.g. aspect, shading, exposure to wind) on papillae presence or absence. Some leaves have two plicae near the centre of the leaf, as described by Ramsay et al. (2004) for *M. intextum* (as *M. tenellum*). However, *M. intextum* has smaller leaves ( $0.25\text{--}0.3 \times 0.2$  mm) with no papillae.



**Fig. 6.** *Meiotheciella papillosa* (Cairns WT-098B & Meagher): (a) habit, dry, (b) papillae on laminal cells, (c) apex of perichaetial leaf, showing the serrulate margins. Scale bars: a = 5 mm; b = 10  $\mu\text{m}$ ; c = 50  $\mu\text{m}$ .

***Philonotis slateri* (Hampe) A.Jaeger (Bartramiaceae)**

Cochable Creek/H Road, Tully Gorge National Park, A. Cairns WT-614A & D. Meagher, 27 May 2015 (BRI-AQ858162), on rock in creek (Fig. 7).

The only other record from the Wet Tropics is a collection by Hugo Flecker in 1937 (Campbells Creek, Cairns area, exact locality uncertain, *Flecker s.n.*, 16 May 1937, CANB-362179). The Wet Tropics is a significant disjunction for this species. The nearest other records are from around Brisbane.





Fig. 7. *Philonotis slateri* habit (Cairns WT-614A & Meagher). Scale bar = 10 mm.

***Rhynchostegium nanopennatum* (Broth.) Kindb. (Brachytheciaceae)**

Broadwater, Abergowrie State Forest, west of Ingham, D. Meagher WT-221 & A. Cairns, 1 Sep 2013 (BRI-AQ858154), epiphytic on an Alexandra Palm (*Archontophoenix alexandrae*) in an extensive colony covering the base of the trunk (Fig. 8). *Rhynchostegium nanopennatum* is endemic to the Australian Wet Tropics and seems to be extremely rare. It was first collected by Frederick Bailey in 1889 from the Bellenden Ker area (Bailey 597, BRI-AQ0721982), probably at a low elevation near Fishery Falls. The holotype is in H-BR (herb. Brotherus, University of Helsinki) and an isotype is in the Swedish Museum of Natural History (S-B125438).

The only other previous collections we know of were made by William Watts in July 1913 — Watts Q296, NSW752137; Watts Q297, NSW752135; Watts NQ416, NSW752138 — mostly from a cluster of sites around the Bellenden Ker Range between Babinda and Russell River, presumably at low elevations since Watts never ascended the range. One of his collections, from Frenchman Creek at the base of the range (Watts s.n., MEL-32744A) he sent to Victor Brotherus for identification. Another was from the base of Bartle Frere, just south of the Bellenden Ker Range (Watts Q285, MEL-2331901B), exact locality unknown. Watts Q76, NSW752139 ‘Comm. Bailey’ (i.e. sent to Watts by Bailey) might be part of the type material, but without more information we cannot be certain of this.

The only other Watts collection is from ‘Dick’s Kuranda’ (Watts Q433, NSW752126), no doubt referring to the Fairyland Tea Garden operated by the Dick family.

This new record extends the known range of the species southward by about 120 km from the nearest other record near Babinda. It is possible that other specimens exist in Australian herbaria under other names, since its peculiar habit might easily lead to misidentification.

***Trachythecium verrucosum* (A.Jaeger) M.Fleisch. (Hypnaceae)**

New records: Mt Edith Road, Danbulla National Park near Lake Tinaroo, North Queensland, on concrete edge of bridge, D. Meagher WT-028 & A. Cairns, 15 Sep 2012 (BRI-AQ858155) (Fig 9a); Red Cedar Walking Track, east of Yungaburra, epiphytic on base of Red Cedar (*Toona ciliata* var. *australis*), D. Meagher 1158, 06 Jun 2000, herb. D.A. Meagher in MELU; Mossman Gorge, Weber sn, 19 Apr 1968, CANB-302181. The specific identity of CANB-302181, previous identified only to genus, was confirmed by Judith Curnow by examination of the capsules. These are the first new records of this species from Australia for almost 70 years. The only other records were from Ravenshoe on the Atherton Tablelands (Watts Q661, Aug 1913, NSW70069) and Mossman Gorge (Brass 18167, 18178, 16 Mar 1948, FH-258505, 258504).



There might be other unrecognised collections of *Trachythecium verrucosum* in Australian herbaria. Klazenga (2012) noted that sterile collections could be misidentified as *Ectropothecium* because all species in that genus also have a solitary, thin-walled, inflated, hyaline cell at the basal margin of the alar group (Fig. 9b). These cells, like those of *Ectropothecium* spp. are easily torn when separating leaves for microscopy and are better observed by examination of intact branches (Fig. 9b). The capsule of *T. verrucosum* — warty, and constricted below the mouth (Fig. 9c) — distinguishes it from the smooth capsules of *Ectropothecium* species.



**Fig. 8.** *Rhynchostegium nanopennatum* (Cairns WT-221 & Meagher): (a) habit of dry plant, (b) wet plant with perichaetia, (c) whole leaf, (d) capsule, (e) calyptra, (f) perichaetial leaf, (g) apex of stem leaf. Scale bars: a = 10 mm; b–d = 1 mm; e, f = 0.5 mm; g = 0.1 mm.





**Fig. 9.** *Trachythecium verrucosum* (Meagher WT-028 & Cairns): (a) habit, (b) stem stained with toluidine blue, showing the large, solitary alar cell at the basal leaf margin (arrowed), (c) capsules, showing the wartiness caused by bulging exothecial cells. Scale bars: a = 10 mm; b = 100  $\mu$ m; c = 1 mm.

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